Center Independent Research & Development: GSFC IRAD

MM-Wave Radiometer Front-end Development

Completed Technology Project (2012 - 2016)

Project Introduction

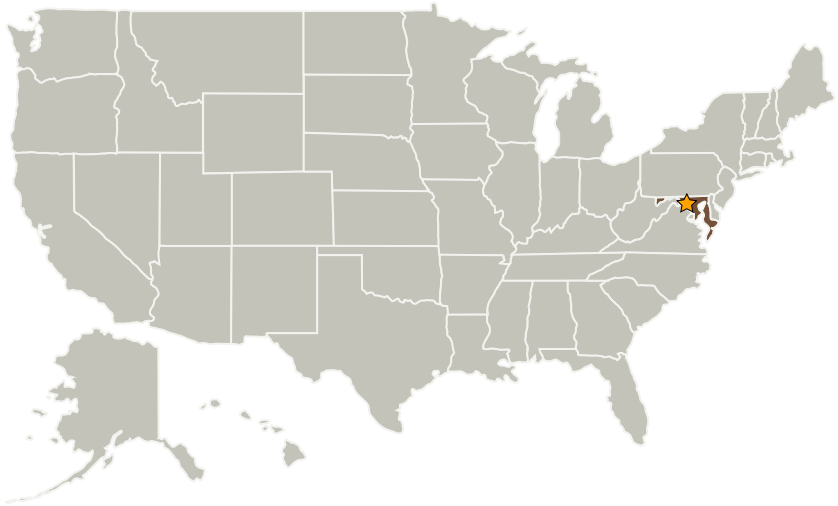
The goal of this project is to develop integrated miniaturized millimeter-wave (MMW) reciever modules for radiometric applications. For this project we will develop an on-chip waveguide-coupled noise source, an on-chip waveguide-coupled coupler, a waveguide-packaged low-noise amplifier (LNA), and a mixer. These are enabling technologies for Earth Venture class passive MMW remote sensing applications such as atmospheric sounding, precipitation and ice cloud measurements.

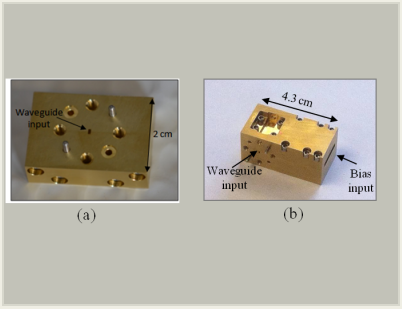
Currently, we developed a MMW LNA and noise source. We designed and fabricated waveguide housing and transition circuitry, developed new processes for packaging, and packaged and characterized these two components. Both the LNA and noise source are vital components in a radiometer front-end that are not commercially available at these frequencies. The LNA will significantly reduce the noise temperature of a heterodyne receiver, enabling hyperspectral capabilities, and the noise source will allow fast internal calibration reducing mass, cost, and complexity. We will design packaging and circuitry to integrate the LNA and the noise source with other components of the receiver to develop a fully integrated miniaturized MMW receiver.

Anticipated Benefits

N/A

Primary U.S. Work Locations and Key Partners





(a) Packaged MMW noise source, (b) Packaged MMW LNA

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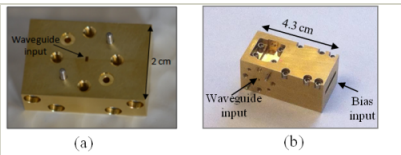
Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Images



Packaged MMW noise source and LNA
(a) Packaged MMW noise source, (b) Packaged MMW LNA
(https://techport.nasa.gov/image/4222)

Links

GSC-17013-1
(https://ntts.arc.nasa.gov/app/)

Project Website:

http://aetd.gsfc.nasa.gov/

Organizational Responsibility

Responsible Mission Directorate:
Mission Support Directorate (MSD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Independent Research & Development: GSFC IRAD

Project Management

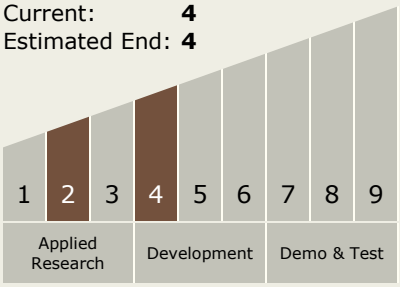
Program Manager:
Peter M Hughes

Project Manager:
Terence A Doiron

Principal Investigator:
Negar Ehsan

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves